

Ontario fish and wildlife Review

Vol. 14, No. 1, 1975



How can we prepare five million rabies vaccines? Freeze-dried, vacuum-packed, and irresistible to foxes? If you give up, turn to page 17 for a research tale of mystery and detection.



You may get a bug-eyed surprise out of the fisheries management report on "polluted" Toronto and its "rat race" urban sprawl. Believe it or not. Page 3.



Ducks are coming back to where they used to nest long ago. How do you turn back the clock and turn on ducks? Well, up to a point, it's all in the way you box your nest. Page 9. Back cover photo of wood duck by Bruce Colvin.

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The goal of the Ministry of Natural Resources is to provide opportunities for outdoor recreation and resource development for the continuous social and economic benefit of the people of Ontario, and to administer, protect and conserve public lands and waters.

Ontario Ministry of Natural Resources

Hon. Leo Bernier
Minister

Dr. J. K. Reynolds
Deputy Minister

EDITORIAL

A CHALLENGING VISION

Why bother with fishing in Toronto and its environs? It is partially to satisfy the growing demand for recreational fishing by many urban residents. However, there are a number of other significant reasons.

We humans, who have for so long paved our fields with asphalt and concrete, clear-cut our forests and filled in so many marshes, have an obligation to preserve some natural environments within our spreading urban area. Our native fish species, even those of the recent past, deserve a place in Toronto's remaining natural environment. What better place to express a deep respect for nature than within our cities!

Operation Doorstep Angling, as reported elsewhere in this issue, is a project for anglers, but non-anglers will benefit as well because they will know that waters which produce salmon, trout, pike and walleye are "healthy" waters.

The above-named species and many others are "barometers" of healthy aquatic habitat. The many pike in Frenchman Bay, countless largemouth in Heart Lake, spawning pike at the mouth of the Humber River, migrating rainbow trout in Duffin Creek, whitefish off the Scarborough Bluffs, and a few splake along the waterfront reveal an aquatic habitat that is far better than most people suspect.

Instead of always looking to waters farther north in unpolluted areas, let us turn to the waters at home that once teemed with fish. Isn't it about time that we enhanced the aquatic habitat in our urban areas. We have the technology and knowledge to improve our city waterways. By bringing back the fish, we will be correcting some of our past mistakes. If that isn't a noble venture, what is?

To develop and sustain a sport fishery for native fish species in an urban setting is an exciting challenge.

Operation Doorstep Angling is but one project among many that are encouraging the gradual rehabilitation of fish in Lake Ontario. Now that is a monumental challenge.

For too long, we have turned our backs on the Great Lakes, regarding them as too big to tackle or too polluted to reclaim. Neither outlook is worthy of a fighter for the environment. In our local endeavours, we are benefiting the entire ecosystem of the lake.

What is good for fish is good for people. There is no denying that fish are as sensitive to adverse changes in the aquatic habitat as humans are to toxic materials in the air. When we make the water habitable for fish, we make it clean for people.

Any improvement in fish habitat in and around Toronto benefits everyone. But it's the pensioners, the children, the disabled, and the people without cars who will sit by a lagoon on Toronto Island or rest on the banks of the Humber River by Bloor Street and appreciate many relaxing hours of fishing close to home.



SAMPLING STATIONS
Operation Doorstep Angling



OPERATION DOORSTEP ANGLING

by I. D. Macnab and B. A. Barton,
Biologists, Maple District. Photos by Authors and Crew

BEFORE the arrival of the white man, Lake Ontario teemed with fish, and Indians fished the waters about Toronto. Settlers from Europe often bought lands and built homes with money derived from the sale of fish caught in rivers near Toronto. Sir D. W. Smith, the first surveyor-general of Upper Canada (1800-4), reported in 1799 that the Humber River "abounds in fish, especially salmon". The Glen Major Angling Club was established on the headwaters of Duffin Creek in 1895.

The former abundance of fish is now a fond memory, and angling has lost its place as a major activity in the Toronto area.

Operation Doorstep Angling, commenced in the fall of 1973, is a two-year assessment of the potential for a recreational fishery in and about Toronto. It is sponsored by the Ministry of Natural Resources and the Metropolitan Toronto and Region Conservation Authority.

In the summer of 1974, we began our assessment of the fishery resources, examining and recording fish populations and aquatic habitats. We found that some habitats require improvement to support a natural fishery, while others are suited only to put-and-take fishing.

Hoop, gill, trap and seine nets, and an electric fish shocker were used to sample the fish populations. Eight sampling stations were located along the waterfront between Etobicoke Creek and Duffin Creek, and 16 stations were located inland. At all sites, the water was analyzed, and physical data were collected.

In the spring, many fishermen were ob-

SAMPLING STATIONS (See Left)

1. Etobicoke Creek Estuary
2. Humber Creek Estuary
3. Hearn Generating Plant
4. Bluffer's Park
5. East Point
6. Rouge River Estuary
7. Frenchman Bay
8. Duffin Creek Estuary
9. Lower Duffin Creek
10. Greenwood
11. Claremont
12. Glen Major
13. Goodwood
14. Lower Rouge River
15. Milne Reservoir
16. Bruce's Mill
17. St. George Lake
18. Lower Humber River
19. Boyd
20. Humber Trails
21. Albion Hills
22. Palgrave
23. Claireville Reservoir
24. Heart Lake



Data processing as a spectator sport. Rob Evans (left) and Ian Macnab.

served netting smelt in the evening at Etobicoke Creek, Humber River, Hearn Generating Station, Frenchman Bay, and the mouth of Duffin Creek.

Every evening during the smelt run, hundreds of people flocked to the Hearn Generating Station, milling along the road, jostling each other on the banks, and wandering about in the dark, searching for a lost spotlight or a better place to fish. It was like a midnight circus with lights from a hundred flashlights blinking and moving about, with a steady babble of voices in the dark background.

Some people kept alewives as well as smelt. They claimed that alewives were very tasty when fried in butter until crisp. Perhaps, if alewives were promoted, they would become as popular as smelt.

Throughout the summer, children frequented the Humber River mouth, Hearn Generating Station, Rouge River mouth, Frenchman Bay, and Duffin Creek. Adults were more evident on weekends. Most anglers fished from the shoreline sector where access was easy. This points out the need to improve access for anglers. Floating piers might enable the anglers to fish deeper waters.

Frenchman Bay produces 19 fish species of interest to the angler plus many small fishes suitable as a forage base. The Bay is particularly abundant in brown bullheads and white perch. Northern pike, yellow perch, pumpkinseed, bowfin and rock bass are also numerous. A catfish weighed an exciting 7kg (15 pounds). The Bay has a great potential for angling.

At the mouth of the Rouge River, anglers frequent the south shore of the river marsh where a road and parking lot give easy access to the water. The marsh abounds in brown bullheads, but there are also plenty of yellow perch, white suckers, northern pike and smallmouth bass to delight the anglers. Children enjoy climbing along the east bank of the river channel and fishing for smallmouth bass.

The marsh at the mouth of Duffin Creek harbours good populations of brown bullheads, white suckers, white perch, yellow perch and carp. The best angling is in Lake Ontario, itself, just off the creek mouth where a large catch of yellow perch may be the angler's reward.

The most popular fishing spot along the waterfront is at the Hearn Generating Station where 17 fish species are attracted by the food organisms produced by the warm, swirling current from the station. During



Curt Malinsky describes fish "sample" to future angler.



Jerry Smitka returns fish "sample" to water, alive, unharmed.



Close to the city, natural angling areas delight Toronto youngsters.

the spring, it supports a large smelt fishery. During the summer, many anglers come here, regularly catching white suckers and white perch, and periodically hauling in northern pike, brown bullheads and white bass.

East of Toronto, below the towering cliffs of Scarborough Bluffs, the waters teem with brown bullheads and lesser numbers of rainbow smelt, white sucker, American eel, white perch and yellow perch. Unfortunately, the steep cliffs prevent easy access to the water, so most anglers should travel by boat.

Bluffer's Park, now being established by the Authority along the Scarborough Bluffs, should be a boon to anglers because it provides good access to the lake. The most abundant fish in the area are round whitefish that average one kilogram in weight. They are found near small shoals which rise from the depths to within 10 metres of the surface. Smallmouth bass also entice anglers.

The lakes close to Toronto are generally underated in favour of the clearer, cooler lakes to the north. The warmer, more eutrophic, local lakes are highly productive, however. With proper management, they can become an angler's delight within minutes of home.

A good example is 17-hectare Heart Lake

Bruce Barton (left) and Jerry Smitka with hoop net



Ian Macnab with 15-pound channel catfish on Frenchman Bay.



which already has a successful recreational fishery in the area just north of Brampton. Largemouth bass and brown bullheads made up the majority of the fish netted here. Bass up to 2.2 kg were reported during the 1974 season. Large numbers of largemouth bass fry were seined inshore, indicating that the bass angling quality of Heart Lake will likely remain high for a number of years.

St. George Lake, 10 hectares in area, is undeveloped and has virtually no fishing pressure. Presently, the lake supports a healthy, mixed population of northern pike, largemouth bass, rock bass, bluegill, pumpkinseed, brown bullhead and yellow perch. When the area is developed for recreation, the lake must be properly managed for angling to prevent over-exploitation of the larger fish such as pike and largemouth bass.

Man-made reservoirs offer unique opportunities for fisheries management. In the central United States, they produce world record game fish. The local reservoirs are limited in size, but they still offer an angling potential compatible with other forms of recreation.

Claireville Reservoir has a surface area of 49 hectares on the west Humber River. It supports largemouth bass, white suckers, pumpkinseed and rock bass. White suckers comprised from 60 to 85 per cent of the fish caught in 1974. Largemouth bass are successfully spawning in Claireville as indicated by the large quantities of fry netted in the shallows.

Milne Reservoir, on the Rouge River, has similar characteristics, but is is much smaller. Its most abundant fish species is carp. Other fish include rock bass, pumpkinseed and brown bullhead.

Perhaps the greatest single factor, limiting the present recreational fishery in these reservoirs, is the quality of the water flowing into them. Around Metropolitan Toronto, the rivers flow through tracts of open and industrialized land and developed urban areas. If the full fishing potential of the reservoirs is to be realized, active sources of pollution must be kept in check.

Smaller lakes or ponds, such as those found at Albion Hills or Bruce's Mill conservation areas, can also provide angling enjoyment. Pumpkinseed, largemouth bass, yellow perch and brown bulheads are found in these waters. Because of their smaller size and easy access, such waters offer a prospect for put-and-take fishing.

In contrast to lakes and reservoirs, flowing waters offer angling potential of a different nature. Swift, cold, clear streams tempt the fisherman to test his skills against the current, and the streams close to Toronto are no exception.

Rainbow and brook trout are found throughout Duffin Creek in Greenwood, Claremont and Glen Major conservation areas. In the Albion Hills area, the upper Humber River supports these species as well as the elusive brown trout. In the Glen Major area, 81 per cent of the fish caught were brook trout, and 55 per cent of them were young-of-the-year, indicating a healthy, naturally reproducing population. Greenwood, Claremont and Albion Hills are well developed recreational areas and provide unlimited access for stream fishing.

In downstream sections of the Toronto rivers, the fish are characteristic of Lake Ontario. In the fall, the spawning runs of introduced coho or chinook salmon are found in the lower reaches of the Humber River, and they are a challenge to any angler. South of the new Metro zoo and along the Rouge River, visitors to parks may be able to fish for smallmouth bass and crappie while picnicking along the river.

If access and proper management are provided, quality fish will offer wide scope to the doorstep angler in years to come. Floating piers would enable the angler to fish deeper waters and provide additional cover for many fish species. Pathways along lake and river shorelines would open up many areas presently inaccessible to both old and young anglers.

The preservation of spawning areas from further encroachment by development is necessary to maintain and expand present fish populations. Artificial brush piles would increase the cover for fish at some sites. Log or rock deflectors would help to scour the silt from good trout spawning areas in streams, as well as stabilizing the banks and eliminating further silting of gravel beds.

Old timers still remember when lake trout, sturgeon and large pike were caught along the waterfront. It was not so long ago that Atlantic salmon frequented Toronto harbour and sought the rapids of the Humber and Don Rivers. There is a fishing tradition in Toronto, and it should not be ignored. To attempt to resurrect the original fishery would be unrealistic, but to aim for a partial recovery is an admirable goal and one which Operation Doorstep Angling hopes to achieve.



The author checks a nest box, accessible only by canoe. — Photos by Wm. Lanning.

A HOUSING PROGRAM FOR DUCKS

by G. J. Haarmeyer
Fish and Wildlife Management Officer, Maple District

THE Oak Ridges Moraine, just north of Metropolitan Toronto, is dotted with numerous, small potholes and swampy areas as well as many artificial ponds. Some of these small bodies of water are attractive to ducks because they have been allowed to remain in their natural state. Here, the ducks come and raise their young.

In March, 1972, the Ministry of Natural Resources started a nest-box program in the northwestern part of King Township, approximately 25 miles northwest of Toronto. The program centred on five private ponds which were swampy pockets, retaining water throughout most of the year. To ensure that water would be available all year on three of the ponds, the landowners had built earthen dams to catch the spring runoff and thus raise the water level and enlarge the ponds. The primary purpose of the pond enlargement was to attract more waterfowl to the vicinity.

All the ponds supplied cover and food for waterfowl. However, wood ducks nest in cavities in dead trees, and these were not available.

Fifteen nest boxes were placed at various locations around the five ponds. The heights of the entrance holes varied from five to thirty feet, and the holes faced a variety of directions.

The boxes were partially filled with wood shavings and nailed to both dead and live trees. Each winter, they were cleaned and the shavings were replaced. Since predation in the area was considered of minimal consequence, no devices for protection against predators were used. The boxes were left alone until June when they were checked for occupancy.

During the first year, wood ducks used only two of the boxes, but ten were used by other forms of wildlife. The evidence of other species included the nests and eggs of

starlings and a wasp hive attached to the lid of a box. (See Table.)

The second year was more successful with wood ducks nesting in five boxes. Hooded merganser evidence (shell fragments) was found in one box; thus, we had harboured two species of ducks. A screech owl was also discovered nesting in one of the boxes.

In the late winter of 1973-4, five additional boxes were erected. A close scrutiny was kept throughout the 1974 nesting season, and each box was checked at various times during the spring.

The 1974 nesting season was the most successful to date (Table) with 19 out of 21 boxes used by some form of wildlife. Wood ducks built nests in twelve boxes while hooded mergansers nested in three. Each of the latter three boxes was occupied by hooded mergansers in early spring, and then by wood ducks in the early summer.

Nesting baskets for mallards (wooden crates with straw) and nesting platforms for Canada geese were also erected by the landowners. Two pairs of geese successfully nested and raised their young. One hen mallard used a mallard basket but was unsuccessful in hatching her eggs.

In three years of operation, the nest boxes have helped to produce 129 wood ducks, 77 hooded mergansers, nine American kestrels and four screech owls, as well as housing a variety of other wildlife. The nesting structures made a positive impact on the wildlife population at this locale.

With the large number of ponds present in the Oak Ridges Moraine, it is evident that wildlife populations can be substantially increased with the introduction of artificial nesting structures on or near the ponds.

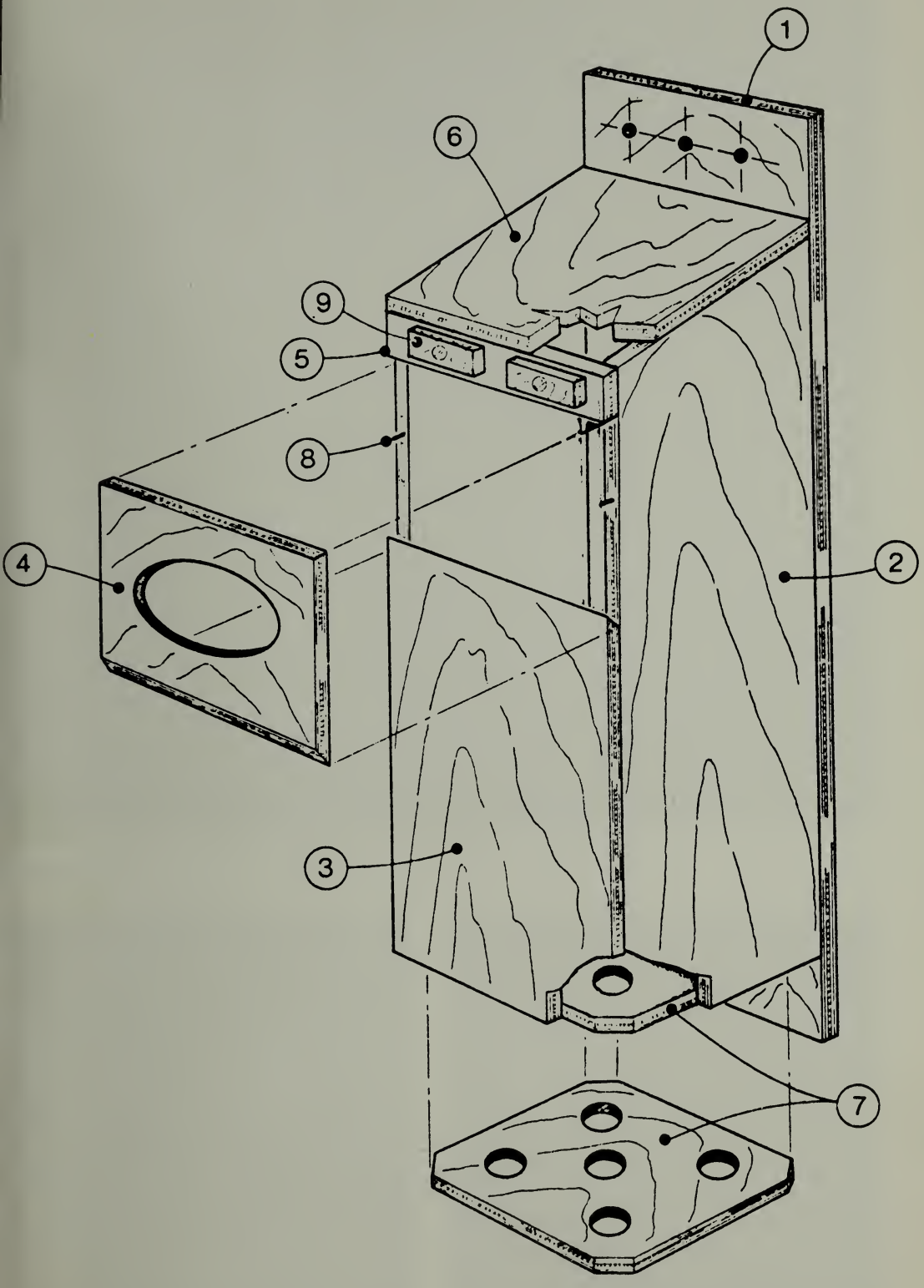
Participating landowners are enthusiastic about the wildlife nursery on their lands as they have received endless hours of enjoyment, viewing and photographing the various species now at their doorstep. Many other landowners have the same possibilities for enriching their lives by joining in the program.

CONSTRUCTION OF NESTING BOX FOR WOOD DUCKS

(See drawing, facing page)

No.	*Description*	*Size*	*Directions*
1	Backing Plate	9½ x 24	Both top and bottom are pre-drilled for hanging hardware.
2	Side Plates	9½ x 17 9½ x 18	Front Rear
3	Front Plate	9½ x 16	Cut the front in one piece. To make the detachable inspection plate, measure 5″ from the top and mark a line on the outer side of the front plate. Set the saw for a 30° cut and cut the inspection plate 5″ on the outside and 5½″ on the inside of the box.
4	Inspection Plate	9½ x 5 9½ x 5½	Cut an oval entrance hole 3″ high and 4″ wide. For hooded mergansers, cut the hole 2½″ high and 3¼″ wide.
5	Turn Button Plate	9½ x 1	Bevel top edge 6° to conform to roof slope.
6	Roof	9½ x 10	Bevel front and rear edges 6° to ensure a tight fit against the backing plate and to allow clearance of the turn buttons.
7	Base Plate	9½ x 8½	Drill five half-inch holes in base. Cut off each corner to ensure proper drainage. Recess the base plate so that the edges are protected from the elements by the back, front and sides.
8	Alignment Pins		Drive two one-inch finishing nails and file heads off to a point. Position the inspection plate and push so that the nails penetrate. This prevents the plate from sliding sideways.
9	Turn Buttons		Fabricate from small blocks of wood.

One sheet of half-inch plywood (sheeting grade) will make five boxes if cut into 8′ strips 9½″ wide. All joints should be nailed and glued. Stain the outside with a light coloured wood preservative. Treat exposed plywood edges with marine varnish. Paint the inside a flat black (optional). Fill bottom of box with two inches of clean shavings.


1
6
9
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8
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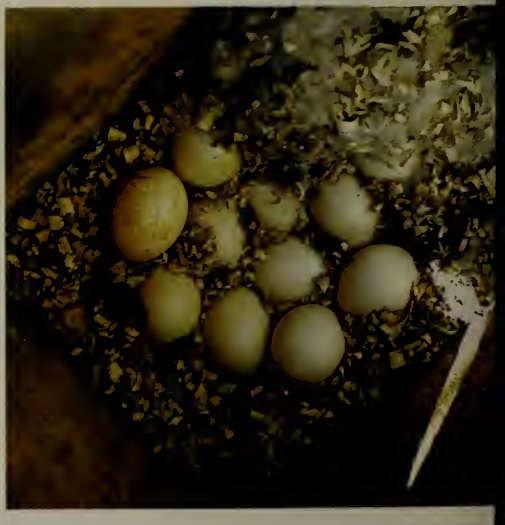


NEST BOXES PROVE THEIR VALUE

Aerial view of



American Kestrel on nest.



Wood duck eggs in nest box.



ponds covered in nest box program, 1972-4. — *Photos by G. F. Haarmeyer*



arling eggs in nest box.



Merganser eggs, hatched and unhatched.



A hooded merganser sits still to be counted.



Typical flooded area where nest boxes encouraged ducks to settle.



The author checks a high nest box.



A nesting box for ducks or Canada geese.



This one had mallard eggs.

RECORD OF NESTING SUCCESS

Showing No. of eggs laid
(No. of eggs hatched)

Box	*1972*	*1973*	*1974*
		POND NO. 1	
1	Starling	Dead Female Wood Duck - 4 (0)	April & May: Nil June: American Kestrel - 5 (5)
2	Wood Duck - 11 (11)	Wood Duck - 8 (8)	April & May: Hooded Merganser - 11 (11) June: Wood Duck - 5 (5)
3	Starling	Starling	(Fallen down)
4	Wood Duck - 11 (8)	Owl scats	Wood Duck - 22 (16)
5	Nil	Nil	Nil
		POND NO. 2	
6	Starling	Screech Owl removed Wood Duck - 9 (9)	Hooded Merganser - 9 (9) Wood Duck - 2 (0)
7	Starling	Squirrel	Hooded Merganser - 3 (2) Wood Duck - 1 (0)
16	N/A	N/A	Wood Duck - 12 (0)
17	N/A	N/A	Starling June: Wood Duck - 1 (0)
18	N/A	N/A	Starling
19	N/A	N/A	Wood Duck - 8 (0)
20	N/A	N/A	Starling
		POND NO. 3	
8	Nil	Wood Duck - 11 (8)	April & May: Nil June: Wood Duck - 7 (7)
9	Starling	Wood Duck - 7 (7)	American Kestrel - 4 (4)
10	Starling	Nil	Wood Duck - 12 (11)
11	Nil	Squirrel	Wood Duck - 11 (11)
		POND NO. 4	
12	Squirrels	Relocated (Fallen off tree)	N/A
		POND NO. 5	
12	N/A	N/A	Wood Duck - 10 (8)
13	Wasps	Squirrel	American Kestrel - 2 (0)
14	Starling	Nil	Screech Owl - 4 (4)
15	Wren	Hooded Merganser - 5 (5)	Wood Duck - 11 (11)
		TOTAL	
	Wood Duck - 22 (18)	Wood Duck - 39 (32) Hooded Merganser - 5 (5)	Wood Duck - 92 (69) Hooded Merganser - 23 (22) American Kestrel - 11 (9)

'DUCKS UNLIMITED' EXPANDS IN ONTARIO

Ducks Unlimited (Canada) will expand its operation into Ontario by mid-summer, 1975, with the opening of an office in London. A full-time area manager will be responsible for DU's proposed wetland conservation program throughout Ontario.

In 1974, the Canadian Wildlife Service requested Ducks Unlimited to co-operate in a pilot program to develop and improve small, shallow, water-filled basins which are valuable to waterfowl and other wildlife species. Six marsh areas, varying in size from five to 15 acres, were developed on privately owned land in the Aurora area, about 20 miles north of Toronto. The landlords provided the necessary land by means of easements, and DU (Canada) underwrote the cost of constructing the various dams and water control structures to improve and maintain waterfowl breeding habitat.

An expansion of the project is planned under the supervision of DU's first Ontario area management. The program is made possible by co-operation with private landowners, Conservation Authorities, Canadian Wildlife Services. Ministry of Natural Resources, and other agencies. The Ontario program will complement the extensive activities in other Provinces. To date, DU has expended nearly $30 million on wetlands development in Canada.



What attracts a fox? Slightly rotten hamburger.

RABIES CONTROL

EXPERIMENTS IN BEHAVIOURAL ENGINEERING

by Charles D. MacInnes and David H. Johnston
Research Scientists, Fish and Wildlife Research Branch

AS human populations become more dense, interactions between man and wildlife will inevitably become more numerous. If we are to have wildlife in future environments, both man and wildlife will have to change their behaviour. We name the business of persuading wildlife to change their ways 'behavioural engineering'. The experimental project we want to discuss is only one part of a comprehensive program aimed at reducing the incidence of rabies in Ontario. It is a joint venture of three Ministries: Agriculture and Food, Health, and Natural Resources.

Rabies is a virus disease which kills a wide variety of animals from man and mouse to cow and dog, from fox and skunk to bat and cat. Rabies became established in wildlife in Ontario between 1954 and 1956 and has remained a serious problem to this day.

The picture is complex. The chief troublemaker is the red fox which passes rabies to farm animals and pets which, in turn, expose humans to the disease. Foxes die so quickly once rabies symptons develop that, in theory at least, the disease should die out because it causes foxes to become so rare that there can be little chance of a rabid fox living long enough to bite a healthy one and pass the disease. Of course, the disease will not die out if other wildlife harbour it and pass it back to foxes.

Enter the striped skunk. Skunks are less susceptible than foxes to rabies, and they live much longer after infection. Captive skunks have remained free of symptons for as long as one year after infection before abruptly coming down with the disease. Skunks with rabies symptoms are less dangerous to man and domestic animals because they are much slower moving and less agressive than rabid foxes. But beware! A bite from a rabid skunk is more likely to pass on the disease. We are not yet sure whether skunks are the key to keeping rabies around, but they are prime suspects.

Serious rabies outbreaks occur about every third year when a local fox population has built up from the last outbreak. In the fall, young foxes break away from their family party and strike out, looking for a home range of their own. They may travel many miles, and they appear to be under considerable stress from encountering new country and new animals. Certainly, they are very susceptible to rabies, and their travels carry



The chief trouble-maker is the red fox.

the disease a long way.

How to break this cycle? New York State hired professional trappers and tried to trap foxes to extinction. But the State still has foxes and rabies.

Alberta succeeded in reducing the strength of an outbreak by poisoning carnivores, principally coyotes which were the main vectors in that Province.

In case it seems logical to eliminate foxes and skunks together, you should know that other canivores, such as weasels, may be important reservoirs. Bats also carry rabies and may spread it over large parts of North America in their migrations. The origin of rabies in our native bats is uncertain, but they may have been infected by vampire bats in Central and South America.

Try another approch. Vaccinate! And here is our problem in behavioural engineering — getting the fox to take the vaccine.

Connaught Laboratories Limited has a vaccine which, taken by mouth, will stimulate immunity to rabies in foxes. But it isn't all that simple. The vaccine is a modified living virus, and therefore, in most circumstances, it is sensitive to external conditions. In the stomach of a fox, digestion breaks it down chemically so that it does not reach the bloodstream in the vaccine form. The best place for the virus to be absorbed into the body is through the wet mucous tissues in the mouth. But foxes sometimes bolt their food. Luckily, the vaccine is in a form that has the consistency of spongy taffy, and it gets very sticky when it comes in contact with the moisture in an animal's mouth.

The best way to keep the vaccine alive for a long period is to freeze-dry it. A combination of warmth (room temperature) and moisture destroys its effectiveness in a few hours. So the vaccine, grown in tissue culture, is frozen, and then all the water is removed by placing the frozen medium in a vacuum. When completely dry, it can stand temperatures up to 100°F and remain potent for days or weeks. But to keep it dry, it must be in a sealed package for, like table salt, it picks up moisture from the air.

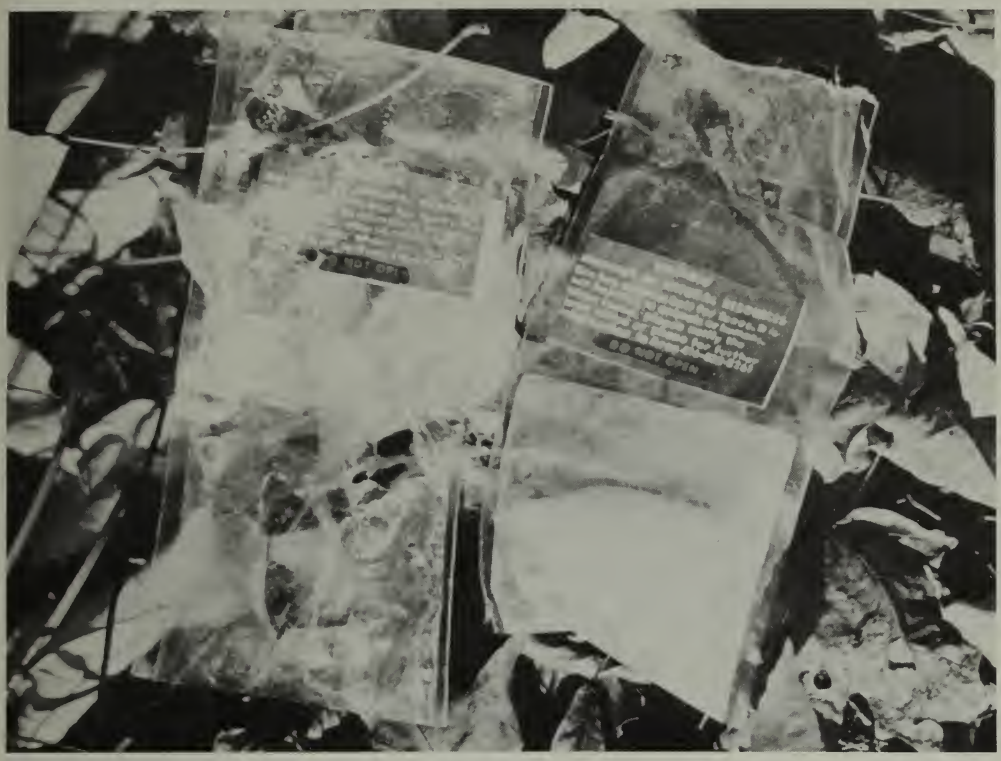
Great! We have a vaccine that sticks in the fox's mouth. But to keep it in this form, it has to be sealed in an air-tight package. Currently, we use a little plastic bag.

More behavioural engineering. How do you get a fox to find a plastic bag, tear it open (rather than gulp it down), and chew the contents which look like nothing it has ever seen before?

To stop an outbreak, a high percentage of the foxes in a rabies area must eat the baits. Some authorities feel we have to reach 70 per cent of the foxes, but this we still have to verify in wild populations.

Let's take it in steps.

Get the fox to the bag, or the bag to the fox. We are trying both tacks. Foxes can be



Air-tight plastic bags set out to lure foxes. One bag has been chewed open.



Beware. A bite from a rabid skunk is dangerous.

attracted by a number of tricks, as any trapper knows. Fox urine sprayed on a bush creates a scent which attracts a fox from a distance.

We have tried over 40 edible substances which have a far-carrying smell. (Ever try to buy 200 pounds of Limburger cheese all at once?) Currently, the best candidate is slightly rotten hamburger. There are indications that we may be able to pull foxes in for some distance by putting out an edible bait weeks before we put out vaccine bags.

Remember, the rabies stricken area in Ontario is about 30,000 square miles. It may take 150 or more baits to the square mile to vaccinate enough of the foxes and skunks as many are eaten by mice or other species. Therefore, any trick we can use to reduce the number of baits required, even by 10 per cent, will save a lot of money if we are ever able to mount a control program.

Now we have the fox to the bait, how do we persuade him to open the plastic bag?

A major breakthrough came about almost by accident. We wanted to know what happened to baits which foxes carried away from where we left them. Did they eventually eat them, bury them, or just drop them?

To find out, we put miniature radio transmitters in bait bags — and here came a big surprise. With normal baits, foxes carried away an average of three out of every ten baits. But add a radio, and they took eight out of ten.

Then realization dawned. If we offered you two paper lunch bags, which you could not open, and told you to take the one that had your lunch in it, and one had contents weighing less than half an ounce (a freeze-dried hamburger) while the other hefted a good eight ounces (balled-up paper with a rock in the middle), which would you take? Well, apparently any fox knows, just by picking up a bag, that if it feels so light it can only be full of air, it's not worth investigating.

Solution — put a small (clean) rock in with the vaccine before you freeze-dry it, and it will be much more intriguing to a fox.

We have also tried flavouring the vaccine. This is tricky because the virus is killed by many substances. Beef bouillon, added before freeze-drying, seems to help the flavour.

There is another behaviour problem we haven't tackled yet. Foxes, like humans, don't like bits of polyethylene bag in their food, so many chew the meat-smeared bag but never get to the vaccine pellet inside.

This is a problem for a packaging expert. What tasty substance can (1) be made into a moisture-proof package into which we can pour liquid vaccine broth; (2) be put through a freezer-drier for 72 hours; and (3) be sealed air-tight afterwards? And we want to be able to make 600,000 or more baits per year at the lowest possible cost. Ideas, anyone?

We have used over 30,000 bait bags in field trials. *None of these bags contained vaccine,* and the contents were harmless to man and animals. We use the same medium, and make them the same way as the true vaccine baits will be made, so that the baits we test are as close to the real thing as possible. But the vaccine needs more safety testing before it can be released for use in the wild.

Connaught has a vaccine which works in the laboratory and has passed every test so far. The Ministry of Natural Resources research group have learned a lot about delivering the bait to the target animals—foxes, skunks and other wildlife. But there is more to learn about the ecology of the rabies vectors before we can guarantee a control program.

IMPROVING WILMOT CREEK

Wilmot Creek in the Town of Newcastle is one of the best rainbow streams in Lindsay District. Currently, it is undergoing a major face lifting. From Highway No. 115 south to Highway No. 401, the Ministry of Natural Resources is attempting to restore the stream to its natural state. In the past two years, work has progressed on stream banks to stop erosion and prevent further deterioration. On a sliding bank, tons of large boulders have been strategically placed. On two other banks where flood conditions have taken away up to 10 feet of bank annually, large wire baskets ("gabions") have been filled with rock and placed against the banks. They were covered with fill to allow the growth of grasses and shrubs. Wildlife shrubs and trees are being planted within the flood plain to hold the soil. Planned future work includes small falls, rock riffles, cutbanks and shaded areas to enhance the appearance of the stream and make it more desirable for both fish and fishermen.

— A. P. O'Donnell, Fish and Wildlife Management Officer, Lindsay District



FIRST RECORDS OF ENGLISH SPARROW IN ONTARIO

by R. M. Alison, Biologist, Wildlife Branch
(Photos by Erika Thimm, Wildlife Branch)

THE reasons for the introductions of some European species of birds to North America have been lost in antiquity. Some have held that New England settlers desired the presence of all the avian species mentioned in the works of William Shakespeare. Others have contended that immigrants, from England in particular, missed the wildlife in the cities of the new world and, as a result, introduced familar species. Whatever the reason, a number of bird species have been introduced to this continent for better or worse, and one was the English sparrow, *Passer domesticus.*

The English sparrow was first introduced into North America in the fall of 1850 when eight pairs from Britain were released in Brooklyn, New York. Additional releases of birds brought directly from England were made in Brooklyn in 1852 and 1853 (about 100 birds); in Portland, Maine, in 1854 and 1858; in Peace Dale, Rhode Island, in 1858; and in Boston in 1858, 1868 and 1869 (30 birds).

Between 1860 and 1881, 12 direct releases involving about 1,500 individuals were made, mostly in the northeastern states.

In Ontario, 10 pairs of English sparrows were released at Ottawa about 1870, and an unknown number of birds, obtained from the United States, were released at Hamilton in 1872. Six pairs from New York City were released at Strathroy in 1874, and unknown numbers were released at Toronto in 1875 and near Oshawa in 1876. A release at London about 1876 involved fewer than 100 birds. In addition, it appears that a few birds were released in the vicinity of North Bay prior to 1882.

There were only three other Canadian releases — Quebec City in 1864, Montreal in 1870, and Halifax in 1875 or 1876.

Approximate Year of First Observations of English Sparrows in Ontario

Hamilton	1874	Mildmay	1878
Pembroke	1874	Trenton	1879
Dunnville	1875	Cottam	1880
Toronto	1875	Hyde Park	1880
Belleville	1877	Plover Mills	1881
Listowel	1877	Galt	1886
Yarker	1877		

By 1882, the range of the English sparrow included all of Ontario south of 45°



latitude. In addition, individuals bred near North Bay and along the Ottawa River to Pembroke. The continental range included the extreme south of Quebec and virtually the entire United States north of Georgia and east of Missouri and Iowa.

During the summer of 1887, the English sparrow spread along the CPR line from Lake Nipissing to Lake Superior. Radial dispersals from practically all United States releases have been documented, and it is likely that, regardless of releases in Canada, the bird would have established itself here in any event.

Although certain Ontario residents were apparently in favour of the early introductions, it was not long before many prominent persons expressed a desire to "exterminate" the bird.

In Montreal, English sparrows were poisoned in 1882. In some parts of Canada, rewards were offered for the birds and their eggs before 1881. Even in England, a bounty of a half-penny per bird was being paid in 1879.

In 1882, published data reported that the bird had caused significant damage to grain and vegetable crops. Furthermore, it reportedly molested 99 species of birds in Ontario. By 1882, the public in Canada and the United States considered the species to be an undesirable nuisance by a margin of eight to one.

It has been estimated that, in the absence of mortality, one breeding pair of English sparrows would result in 275,716,983,698 breeding pairs within 10 years. Even assuming 50 per cent survival and a five-year life span, one breeding pair would produce 33,614 surviving young in 10 years.

Because it damages crops and adversely affects native song birds, the English sparrow is not protected by The Migratory Birds Convention Act nor The Game and Fish Act of Ontario.

Resident individuals may be found at Moosonee, Cochrane, Fort Severn and other northern settlements, but the present range of the English sparrow in Ontario is generally confined to the areas south of the main east-west CPR line (J. C. Barlow, Royal Ontario Museum, personal communication) where it is common in towns and villages and near farms.

DUCK OUT TO DARLINGTON

Darlington Provincial Park

9:00 a.m., Sunday, September 7, 1975

Sportsmen's Waterfowl Day has changed its name and appearance. The new emphasis is on the demonstration of waterfowl shooting sports for the benefit of the audience as well as the competitors.

- Shooting Events for Everyone
- Canadian Duck Calling Championships
- Retriever Show and Demonstrations
- Waterfowl Identification Tests
- Waterfowl Management Demonstrations
- Decoy Head Carving Contests
- Decoy Contest
- Wildlife Art Display
- Food from the Wild
- Bullfrog Jumping Contests



In Ontario, a bull moose is often a solitary figure, even in breeding season.

SHOULD WE HARVEST ONLY BULL MOOSE?

by R. A. Baker, Biologist, Division of Fish and Wildlife.

GAME managers have argued the pro's and con's of harvesting only bull moose for years. Some believe that it improves population productivity because more females are left to breed. Others argue that in sparse populations, such as occur in Ontario, the probable result of harvesting only bulls would be a decline in productivity — there would not be enough bulls left to service the females.

A bulls-only regulation is certain to have two effects on a moose population. The sex ratio will be distorted in favour of females, and the average age of bulls will decline. So the enquiry really boils down to determining whether or not these two changes will have a positive effect on productivity.

Big-game managers in Europe have found that yields from moose populations are greatest when there is a high proportion of prime-aged breeding cows (3½ to 12½ years) and sufficient prime-aged bulls to service the cows during their first oestrus. Prime-aged bulls are required because they are more effective breeders than yearlings or two-, or three-year-olds. There are physical and behavioural reasons for this. A prime-aged bull (4½ to 10½ years) is physically stronger and shows more searching behaviour than younger animals. A high proportion of prime-aged cows are necessary for maximizing yield because they are more effective breeders than younger or older animals.

Since a bulls-only regulation results in a reduction in the number of bulls and in their average age, it follows that the total breeding effectiveness of bulls will be reduced because there are fewer of them. And their average breeding effectiveness will be reduced because the bulls will tend to be younger.

Despite the bulls' lowered effectiveness, it is still possible that all breeding females will be serviced if their population densities are high enough. That is the case in Alaska. On the other hand, it is not the case in parts of Sweden, Russia and Ontario where populations are sparse and where bulls must search longer before finding a breeding female. Game managers who reduce the numbers and average age of bulls in such areas run the serious risk of reducing population productivity.

In Alaska, where a bulls-only moose season has been in effect for many years, the



Before. Alaska bull moose and cow in first stages of 'courtship program'.

average age of bulls is less than three years, and their proportion of the population is only 10 per cent. Yet breeding success (75 to 85 per cent pregnancy among females 1½ years and older) appears to be unaffected. It is only when the sex ratio drops below 10 bulls/100 cows that breeding success begins to decline.

Why should breeding success be mantained with such a distorted sex ratio and so low an average of bulls? The average and total breeding effectiveness of bulls must certainly have declined dramatically over the years. This did *not* result in a drop in breeding success, it is argued, because moose in Alaska form harem-like groups during the rut, and, in addition, over-all moose densities are high. Bulls, therefore, do not have to "work" as hard to search out a female in breeding condition.

Their effectiveness at doing this is, therefore, not as critical as it would be in a sparse population such as we have in Ontario.

Nevertheless, even in Alaska, a bull has to move quickly to service two or more females. He *has* to be able to get around fairly well because there is only one of him to every ten females. A bull requires two or more days to run through his courtship "program" with each cow he encounters. In addition, a cow's receptive stage lasts less than 24 hours, and in the same region most cows come into oestrus within the same short period of time. The actual peak is generally the last week in September.

It is only the bulls of prime breeding age that can make the most of this situation. Young animals just do not have what it takes—a strong drive to search for females in breeding condition, and the strength to carry through — again and again. Alaska is exceptional in that bulls do not have to be all that effective in breeding to get from 75 to 85 per cent of the cows (aged 1½ years and older) bred.

In northern Sweden and parts of Russia where moose densities are comparable to those in northern Ontaro (less than one moose per square mile), there is evidence to show that the proportion of bulls in the population must be kept high (40 to 50 per cent), for cows to be bred. At low moose densities, bulls must search longer before they find a receptive female.

An added problem is that moose in eastern Canada, Scandinavia and Russia do not concentrate during the rut. This compounds the searching problem inherent in low-density populations. Swedish researchers also found that, when the proportion of bulls is low, a significant number of cows are not bred until late in the fall. This means that many calves are not born until late the following spring. Calves born late are less likely to survive their first winter.

For these reasons, Sweden has changed its moose hunting regulations to direct hunting pressure at calves and yearlings of either sex rather than older animals of prime breeding age. A very significant increase in vigour, productivity and sustained yield has resulted. In fact, the annual harvest has in-



After. — *Alaska photos by Mary Bubenik.*

creased from 30,000 to 40,000 animals, and there is evidence that this harvest can be increased still further.

Alaska game managers are trying to get rid of their bulls-only hunting regulation. They have evidence to show that better, sustained yields are possible with either-sex seasons. They point out that it is incorrect to suppose that all females shot in the fall (under an either-sex regulation) represent a loss to population productivity. Some females, particularly young ones, die every year from natural causes, and a bulls-only regulation does nothing to protect them. An either-sex regulation would ensure that some of these females are harvested by hunters in the fall rather than by Mother Nature in the winter.

In Alaska, pamphlets have been published to argue the case for abolition of the regulation. Success at persuading the public and representatives has, however, been minimal.

The Yukon had a bulls-only regulation for many years, but abolished it in 1974 because it only served to hold down hunting pressure in the many inaccessible and under-harvested areas. It had no significant effect on productivity.

British Columbia introduced a bulls-only regulation to a 30-square-mile area around Prince George in 1974. Alberta introduced the same regulation in wildlife management units in 1974 for non-residents only. Newfoundland has had a token bulls-only regulation since 1972 although pressure has been mounting to increase the number of permits issued. It is too soon to assess the results in any of these Provinces.

The following reasons are given for *not* introducing a bulls-only regulation in Ontario.

In inaccessible areas, hunting pressure is relatively low and many populations are under-harvested. A bulls-only regulation would only serve to reduce the harvest.

In accessible areas, moose densities are very low, the proportion of bulls is less than 50 per cent, and hunting pressure is high. A bulls-only regulation would result in a very rapid drop in the proportion of bulls and in their average age. This, in turn, would cause a decline in their breeding effectiveness to the point of adversely affecting breeding success and calf survival.

Two non-biological reasons for not having a bulls-only regulation can also be given.

First, the regulation has been found to be almost impossible to enforce in the case of resident hunting. Non-resident hunting presents no problem because non-residents must have an export permit to take their moose out of the Province.

Second, once a bulls-only regulation has been introduced, it is extremely difficult to have it removed. This is a social problem that is very difficult to overcome, as Alaska is finding out. Other states have encountered the same problem with respect to bucks-only deer-hunting regulations. The usefulness of any regulation that is unenforceable and difficult to remove, when circumstances require it, must be seriously questioned.

